

WHAT IS CLAIMED IS:

1. A power output apparatus comprising:
 - a first inverter;
 - a second inverter;
 - a 2Y motor having a first three-phase motor coil and a second three-phase
 - 5 motor coil functioning as stators, energization of said first and second three-phase motor
 - coils being controlled respectively by said first and second inverters;
 - a power supply connected between a first neutral point of said first three-phase
 - motor coil and a second neutral point of said second three-phase motor coil;
 - a capacitor element provided on an input side of said first and second inverters;
 - 10 and
 - a control unit controlling said first or second inverter to allow a precharge
 - operation for precharging said capacitor element to be performed.
2. The power output apparatus according to claim 1, wherein
 - said control unit controls said first and second inverters to allow a voltage
 - step-up operation for increasing a power-supply voltage which is output from said
 - power supply as well as a drive operation for driving said 2Y motor to be performed
 - 5 after said precharge operation is completed, and
 - said 2Y motor starts an internal combustion engine.
3. The power output apparatus according to claim 1, wherein
 - said precharge operation refers to an operation of increasing a power-supply
 - voltage which is output from said power supply to allow an output voltage of said
 - capacitor element to be at least a reference value.
4. The power output apparatus according to claim 1, wherein

said first inverter includes three arms provided correspondingly to said first three-phase motor coil,

5 said second inverter includes three arms provided correspondingly to said second three-phase motor coil, and

 said precharge operation is performed by using all phase coils of said first three-phase motor coil and said three arms of said first inverter or using all phase coils of said second three-phase motor coil and said three arms of said second inverter.

5. The power output apparatus according to claim 4, wherein
 said control unit controls said three arms of said first inverter or said second inverter to allow said precharge operation to be performed.

6. The power output apparatus according to claim 1, wherein
 said first inverter includes three arms provided correspondingly to said first three-phase motor coil,

5 said second inverter includes three arms provided correspondingly to said second three-phase motor coil, and

 said precharge operation is performed by using a first motor coil selected from phase coils of said first three-phase motor coil and a first arm corresponding to said first motor coil and selected from said three arms of said first inverter, or using a second motor coil selected from phase coils of said second three-phase motor coil and a second arm corresponding to said second motor coil and selected from said three arms of said
10 second inverter.

7. The power output apparatus according to claim 6, wherein
 said control unit controls said first or second arm to allow said precharge operation to be performed.

8. The power output apparatus according to claim 1, further comprising:
a first switch provided between said first neutral point and said power supply;
a second switch provided between said first neutral point and said power
supply and in parallel with said first switch; and
5 a resistor element connected between said first neutral point and said first
switch, wherein
said control unit renders said first and second switches ON and OFF
respectively upon start of said precharge operation and renders said first and second
switches OFF and ON respectively when it is ascertained that said power supply is
10 connected to said first and second neutral points.
9. The power output apparatus according to claim 1, wherein
after said precharge operation is completed, said control unit displays on a
display unit an indication that preparations for driving said power output apparatus are
completed.
10. The power output apparatus according to claim 1, wherein
said 2Y motor generates electric power from a rotational force from an internal
combustion engine.
11. The power output apparatus according to claim 10, further comprising:
an electric motor different from said 2Y motor; and
a planetary gear to which said 2Y motor, said electric motor and said internal
combustion engine are connected.
12. The power output apparatus according to claim 11, further comprising a
third inverter driving said electric motor, wherein
when said control unit drives said first and second inverters to allow said 2Y

5 motor to function as an electric generator, said control unit drives said third inverter to drive said electric motor by electric power generated by said 2Y motor.

13. The power output apparatus according to claim 12, wherein said control unit disconnects said power supply from said first and second neutral points.

14. A motor driving method for driving a 2Y motor coupled to an internal combustion engine of a hybrid vehicle and an electric motor coupled to drive wheels of said hybrid vehicle, comprising:

5 a first step of precharging a capacitor element provided on an input side of first and second inverters controlling energization of first and second three-phase motor coils respectively that are included in said 2Y motor; and

a second step of driving said 2Y motor and said electric motor while further charging said capacitor element after said precharging is completed.

15. The motor driving method according to claim 14, wherein said first step includes

a first sub-step of applying a power-supply voltage which is output from a power supply to said capacitor element via said first or second inverter, and

5 a second sub-step of increasing said power-supply voltage to charge said capacitor element.

16. The motor driving method according to claim 15, wherein said first sub-step includes

5 a step A of connecting said power supply, via a resistor element, between a first neutral point of said first three-phase motor coil and a second neutral point of said second three-phase motor coil,

a step B of ascertaining that said power supply is connected between said first neutral point and said second neutral point, and

a step C of directly connecting said power supply between said first neutral point and said second neutral point after said ascertaining is completed.

17. The motor driving method according to claim 16, wherein
it is determined in said step B that a terminal-to-terminal voltage of said capacitor element is at least said power-supply voltage.

18. The motor driving method according to claim 15, wherein
said first inverter includes three arms provided correspondingly to said first three-phase motor coil,

5 said second inverter includes three arms provided correspondingly to said second three-phase motor coil, and

in said second sub-step, said three arms of said first or second inverter are simultaneously driven to increase said power-supply voltage.

19. The motor driving method according to claim 15, wherein
said first inverter includes three arms provided correspondingly to said first three-phase motor coil,

5 said second inverter includes three arms provided correspondingly to said second three-phase motor coil, and

in said second sub-step, one arm selected from said three arms of said first or second inverter is driven to increase said power-supply voltage.

20. The motor driving method according to claim 14, further comprising a third step of displaying on a display unit, after said precharging is completed, an indication that preparations for driving said 2Y motor and/or said electric motor are

completed.

21. The motor driving method according to claim 14, wherein
said second step includes

a third sub-step of increasing a power-supply voltage which is output from a
power supply to further charge said capacitor element,

5 a fourth sub-step of calculating a first power of said 2Y motor and a second
power of said electric motor,

a fifth sub-step of determining whether or not the sum of said calculated first
power and said calculated second power is equal to zero; and

10 a sixth sub-step of disconnecting, when said sum is equal to zero, said power
supply from respective neutral points (M1, M2) of said first and second three-phase
coils included in said 2Y motor.

22. The motor driving method according to claim 21, wherein
said second step includes

a seventh sub-step of driving said 2Y motor as an electric generator, and

5 an eighth sub-step of driving said electric motor by electric power generated by
said 2Y motor.

23. The motor driving method according to claim 21, wherein
said second step includes

a ninth sub-step of driving, when said sum is unequal to zero, said 2Y motor as
an electric motor, by a direct-current voltage from said capacitor element, and

5 a tenth sub-step of driving, when said sum is unequal to zero, said 2Y motor as
an electric generator while decreasing the direct-current voltage from said capacitor
element to charge said power supply.

24. A computer-readable recording medium having a program recorded thereon for allowing a computer to execute drive control of a 2Y motor coupled to an internal combustion engine of a hybrid vehicle and an electric motor coupled to drive wheels of said hybrid vehicle, said computer following said program to execute:

5 a first step of precharging a capacitor element provided on an input side of first and second inverters controlling energization of first and second three-phase motor coils respectively that are included in said 2Y motor; and

 a second step of driving said 2Y motor and said electric motor while further charging said capacitor element after said precharging is completed.

25. The computer-readable recording medium according to claim 24, wherein said first step includes

 a first sub-step of applying a power-supply voltage which is output from a power supply to said capacitor element via said first or second inverter, and

5 a second sub-step of increasing said power-supply voltage to charge said capacitor element.

26. The computer-readable recording medium according to claim 25, wherein said first sub-step includes

 a step A of connecting said power supply, via a resistor element, between a first neutral point of said first three-phase motor coil and a second neutral point of said

5 second three-phase motor coil,

 a step B of ascertaining that said power supply is connected between said first neutral point and said second neutral point, and

 a step C of directly connecting said power supply between said first neutral point and said second neutral point after said ascertaining is completed.

27. The computer-readable recording medium according to claim 26, wherein

it is determined in said step B that a terminal-to-terminal voltage of said capacitor element is at least said power-supply voltage.

28. The computer-readable recording medium according to claim 25, wherein said first inverter includes three arms provided correspondingly to said first three-phase motor coil,

5 said second inverter includes three arms provided correspondingly to said second three-phase motor coil, and

in said second sub-step of said program, said three arms of said first or second inverter are simultaneously driven to increase said power-supply voltage.

29. The computer-readable recording medium according to claim 25, wherein said first inverter includes three arms provided correspondingly to said first three-phase motor coil,

5 said second inverter includes three arms provided correspondingly to said second three-phase motor coil, and

in said second sub-step of said program, one arm selected from said three arms of said first or second inverter is driven to increase said power-supply voltage.

30. The computer-readable recording medium according to claim 24, said computer following said program to further execute a third step of displaying on a display unit, after said precharging is completed, an indication that preparations for driving said 2Y motor and/or said electric motor are completed.

31. The computer-readable recording medium according to claim 24, wherein said second step includes

a third sub-step of increasing a power-supply voltage which is output from a power supply to further charge said capacitor element,

5 a fourth sub-step of calculating a first power of said 2Y motor and a second
power of said electric motor;
 a fifth sub-step of determining whether or not the sum of said calculated first
power and said calculated second power is equal to zero, and
 a sixth sub-step of disconnecting, when said sum is equal to zero, said power
10 supply from respective neutral points of said first and second three-phase coils included
in said 2Y motor.

32. The computer-readable recording medium according to claim 31, wherein
said second step includes
a seventh sub-step of driving said 2Y motor as an electric generator, and
an eighth sub-step of driving said electric motor by electric power generated by
5 said 2Y motor.

33. The computer-readable recording medium according to claim 31, wherein
said second step includes
a ninth sub-step of driving, when said sum is unequal to zero, said 2Y motor as
an electric motor, by a direct-current voltage from said capacitor element, and
5 a tenth sub-step of driving, when said sum is unequal to zero, said 2Y motor as
an electric generator while decreasing the direct-current voltage from said capacitor
element to charge said power supply.